

# Numbers Sets, Properties, Order of Operations, and Exponents

## Unit 1

Section	Topic	Book Assignment	Packet Page Number
2.1	Number Sets	Self-study WS Graphic organizer Real number sets Kuta Sets of Real Numbers Pg. 90 #16-31	1-2 3 4-5 6
2.1	Properties	Self-study WS Properties (A-K on top) Properties of Real Numbers Practice Exercises Alg 2 Write the property... Pg. 91 #38-55 all	7-8 9 10 11 12
2.1	Order of Operations	2.1 Order of Operations Order of Operations The Beginning Puzzle Pg. 91 #56-70 all	13-14 15-16 17
2.2	Exponents	Why Isn't a Snowman... 2.2 Properties of Exponents Kuta - Props. of Exponents Kuta - Simplifying Ratl Exp Pg. 99 #19-38 all Pg. 99 #39-58 all Pg. 99 #59-69 odd	18 19 20-21 22
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## SELF STUDY WORKSHEET

Name \_\_\_\_\_

### 1.1 The Real Numbers

#### **A) Define the sets of numbers:**

Natural numbers (N)-

Whole Numbers (W)-

Integers (I)-

Rational Numbers (Q)-

Irrational Numbers (Ir)-

Real Numbers (R)-

#### **B) Copy the diagram on Pg 86 of the book**

**C) Let set  $A = \{-8, 3, \sqrt{5}, -\frac{3}{5}, 2.\bar{4}, 0, \frac{4}{0}, 13, \frac{15}{3}, \pi\}$**

List the numbers from set A which belong to:

Natural Numbers-

Whole Numbers-

Integers-

Rational Numbers-

Irrational Numbers-

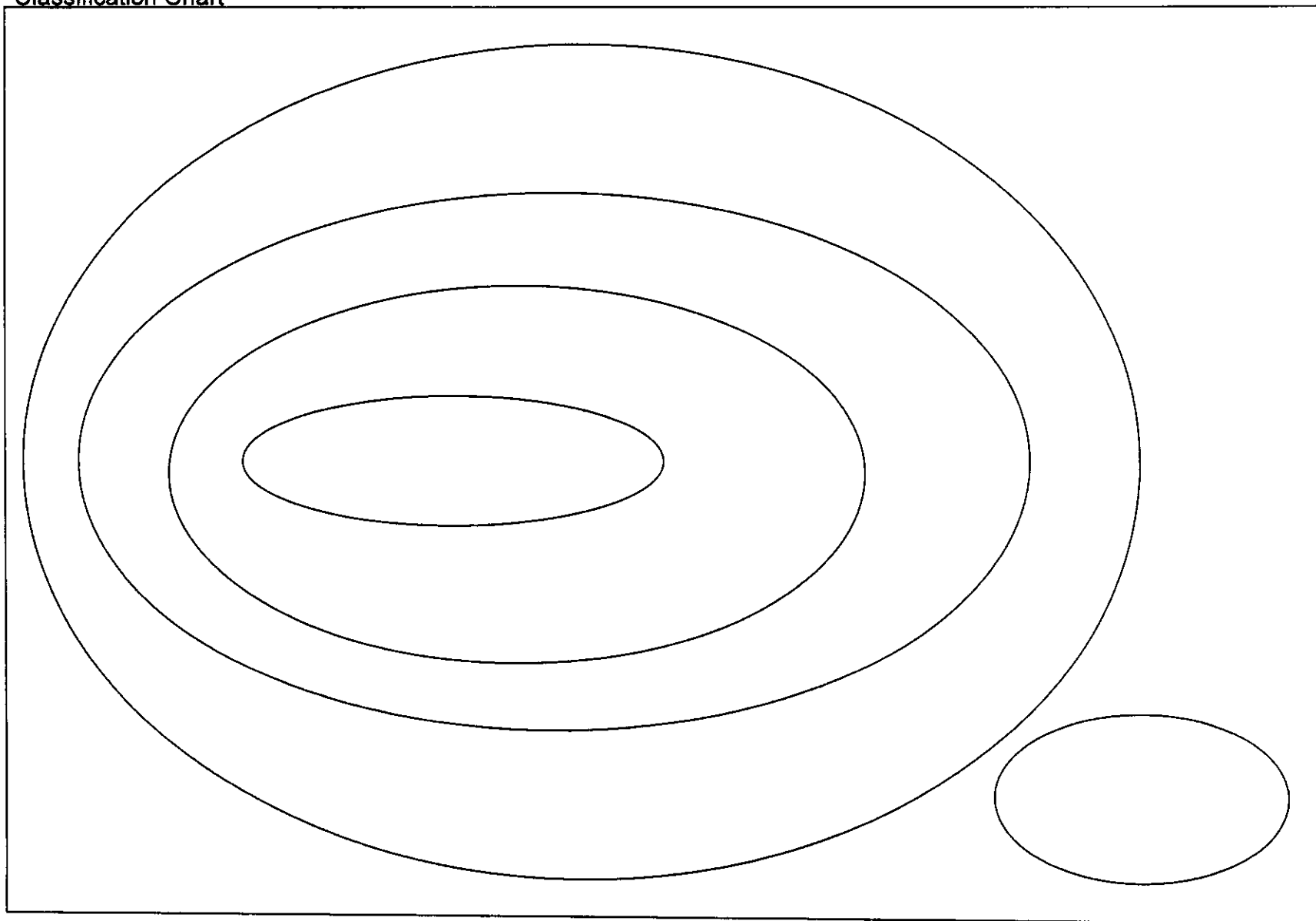
Real Numbers-

**D) Exercise: page 90 16-31 all**

Real Numbers and Their Properties  
Algebra Seminar

Name:

Classification Chart



What are the following number sets?

The set of **Natural Numbers**:

The set of **Whole Numbers**:

The set of **Integers**:

The set of **Rational Numbers**:

Rational Numbers have a decimal expansion that a.) terminates or b.) doesn't terminate

a.)

b.)

**EXAMPLE:** True or False

- a.) Every integer is a rational number
- b.) Every rational number is a whole number
- c.) Every natural number is a whole number
- d.) 3 is an element of the rational numbers

**EXAMPLE:** Express the following rational numbers as decimals:

a.)  $\frac{5}{16}$

b.)  $\frac{10}{11}$

c.)  $-\frac{19}{10000}$

The set of **Irrational Numbers**:

Give three examples of irrational numbers:      \_\_\_\_\_

The set of **Real Numbers**: Consists of all the rational and irrational numbers.

**EXAMPLE:** Determine which numbers in the set are natural numbers, whole numbers, integers, rational numbers, irrational numbers, and real numbers. Then graph each number on the real number line.

$$\left\{-\frac{2}{3}, \frac{\pi}{2}, 0.7, 3, \sqrt{5}, \sqrt{16}, 0, 1, 3.\overline{89}, -4\right\}$$

NATURAL NUMBERS:

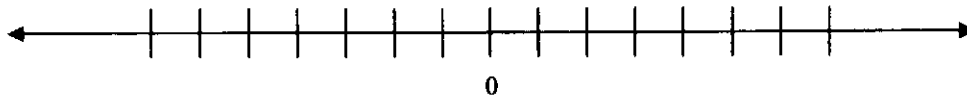
WHOLE NUMBERS:

INTEGERS:

RATIONAL NUMBERS:

IRRATIONAL NUMBERS:

REAL NUMBERS:



Give an example of a number that is a real number but not rational: \_\_\_\_\_

**EXAMPLE:** Place a  $<$ ,  $>$ , or  $=$  symbol between the numbers to make a true statement:

a.)  $\frac{3}{5}$   $\frac{3}{4}$

b.)  $-19$   $-30$

c.)  $\frac{\pi}{2}$   $2.1$

d.)  $\frac{1}{7}$   $\frac{11}{77}$

## Sets of Real Numbers

Date \_\_\_\_\_ Period \_\_\_\_\_

Name the set or sets to which each number belongs.

1)  $-15$

2)  $11$

3)  $\sqrt{30}$

4)  $\frac{17}{3}$

5)  $6$

6)  $0$

7)  $-13$

8)  $3$

9)  $\frac{10}{11}$

10)  $14$

11)  $-13$

12)  $\pi$

13)  $\frac{475}{325}$

14)  $\sqrt{77}$

15)  $\frac{6}{7}$

16)  $\sqrt{0}$

17)  $-\sqrt{196}$

18)  $-1$

19)  $\frac{-16}{-2}$

20)  $\frac{135}{-3}$

# SELF STUDY WORKSHEET

Name \_\_\_\_\_

## 2.1 Properties of Real Numbers

(Textbook Pages: Pages 87)

- A) Complete the equation to illustrate the following Properties of Real Numbers.  
B) **Describe** the property with key words or phrases. **DO NOT** copy the definitions (p. 87) from the book.

1A) Closure + }  $4 + 6 = 10$  10 is a real number  
Closure x }  $4 \cdot 6 = 24$  24 is a real number

B) *When real numbers are added or multiplied the answer is still a real number.*

2A) Commutative + }  $2 + 4 + 6 =$  \_\_\_\_\_  
Commutative x }  $(2)(4)(6) =$  \_\_\_\_\_

B)

3A) Associative + }  $2 + (4 + 6) =$  \_\_\_\_\_  
Associative x }  $2 \cdot (4 \cdot 6) =$  \_\_\_\_\_

B)

4A) Identity +  $4 + \underline{\hspace{1cm}} = 4$

B)

5A) Identity x  $4 \cdot \underline{\hspace{1cm}} = 4$

B)

6A) Inverse +  $7 + \underline{\hspace{1cm}} = 0$

B)

7A) Inverse x  $7 \cdot \underline{\hspace{1cm}} = 1$

B)

8A) Distributive  $2 \cdot (4 + 6) =$  \_\_\_\_\_  
(x over +)

B)



- C) State the name of the property illustrated by each equation, be sure to include the operation. Behind each give a reason that supports your answer (i.e. order of multiplication changed).

\_\_\_\_\_ 1)  $9 + (\sqrt{5} + 0) = 9 + (0 + \sqrt{5})$  \_\_\_\_\_

\_\_\_\_\_ 2)  $2 + 7\left(\frac{2}{3} \cdot \frac{3}{2}\right) = 2 + \left(7 \cdot \frac{2}{3}\right) \cdot \frac{3}{2}$  \_\_\_\_\_

\_\_\_\_\_ 3)  $2 + 7 \cdot 1 = 2 + 7$  \_\_\_\_\_

\_\_\_\_\_ 4)  $6(-4 + 4) = 6(0)$  \_\_\_\_\_

\_\_\_\_\_ 5)  $6(-4 + 4) = -24 + 24$  \_\_\_\_\_

\_\_\_\_\_ 6)  $9 + (\sqrt{5} + 0) = 9 + \sqrt{5}$  \_\_\_\_\_

\_\_\_\_\_ 7)  $2 + 7\left(\frac{2}{3} \cdot \frac{3}{2}\right) = 2 + 7 \cdot 1$  \_\_\_\_\_

- D) Exercises: page 91 #38 – 55 all & Wksht

- A. Closure for Addition  
 B. Commutative for Addition  
 C. Associative for Addition  
 D. Identity for Addition  
 Inverse for Addition

- F. Closure for Multiplication  
 G. Commutative for Multiplication  
 H. Associative for Multiplication  
 I. Identity for Multiplication  
 J. Inverse for Multiplication

K. Distributive for Multiplication over Addition

Use the appropriate letter to name the property illustrated. (Assume that variables represent real numbers.)

- |   |          |  |       |
|---|----------|--|-------|
| 1. $3 + (5 + 7) = (3 + 5) + 7$                  | <u>C</u> | 2. $16 + 27 = 27 + 16$                 | _____ |
| 3. $73 \cdot 86 = 86 \cdot 73$                  | _____    | 4. $12 + 0 = 12$                       | _____ |
| 5. $461 \cdot 1 = 461$                          | _____    | 6. $326 \cdot 1 = 1 \cdot 326$         | _____ |
| 7. $x + (y + 5) = (x + y) + 5$                  | _____    | 8. $73 \cdot 1 = 73$                   | _____ |
| 9. $(m + n)$ is a real number                   | _____    | 10. $a - 3 + b = a + b - 3$            | _____ |
| $x + (-x) = 0$                                  | _____    | 12. $mn$ is a real number              | _____ |
| 13. $73 \cdot 2 = 2 \cdot 73$                   | _____    | 14. $b + 3 = 3 + b$                    | _____ |
| 15. $4(7 + 3) = 4 \cdot 7 + 4 \cdot 3$          | _____    | 16. $5(7 + 2) = (7 + 2)5$              | _____ |
| 17. $7 = 7 + 0$                                 | _____    | 18. $5(7 + 2) = 5 \cdot 7 + 5 \cdot 2$ | _____ |
| 19. $13 \cdot 4 \cdot 10 = 13 \cdot 10 \cdot 4$ | _____    | 20. $8 + a + 0 = 8 + a$                | _____ |
| 21. $(27 + e) + f = (e + 27) + f$               | _____    | 22. $7 \left( \frac{1}{7} \right) = 1$ | _____ |

P

Name \_\_\_\_\_

Practice: For use after Lesson 1.4, Algebra 2 with Trigonometry

## Properties of Real Numbers

Name the additive inverse and the multiplicative inverse for each number.

1. 5 \_\_\_\_\_ 2.  $\frac{5}{11}$  \_\_\_\_\_ 3.  $-\sqrt{5}$  \_\_\_\_\_ 4. 2.3 \_\_\_\_\_

Name the property of real numbers illustrated by each of the following.

5.  $x(2 \cdot y) = (x \cdot 2)y$  \_\_\_\_\_  
 6.  $2 + (-9) = (-9) + 2$  \_\_\_\_\_  
 7.  $6\sqrt{11}$  is a real number. \_\_\_\_\_  
 8.  $a(x + y) = ax + ay$  \_\_\_\_\_

Decide if each set below is closed under addition, subtraction, multiplication, and division. If not, give a counterexample.

9. integers \_\_\_\_\_  
 10. whole numbers \_\_\_\_\_

Name the property that justifies each step in the following proof.

11. For every real number  $a$ ,  $b$ , and  $c$ , if  $a = b$ , then  $a \cdot c = b \cdot c$ .

- |  |          |
|--|----------|
| 1. $a, b, c \in \{\text{real numbers}\}$ | 1. Given |
| 2. $a \cdot c$ is a real number          | 2. _____ |
| 3. $a \cdot c = a \cdot c$               | 3. _____ |
| 4. $a = b$                               | 4. _____ |
| 5. $a \cdot c = b \cdot c$               | 5. _____ |

## Applications

**Modular Arithmetic** Clock arithmetic is a system that uses only positive integers less than or equal to 12. Find the following.

12.  $6 + 11$  \_\_\_\_\_ 13.  $4 - 5$  \_\_\_\_\_

## MIXED PRACTICE

Evaluate each expression using the value given for each variable.

14.  $5a^2 - 7a - 11$ ;  $a = -2$  \_\_\_\_\_ 15.  $4|2c - 1| - 6|2 - c|$ ;  $c = 5$  \_\_\_\_\_

## PRACTICE EXERCISES

Algebra 2  
Unit #1  
WS

Name the property of real numbers illustrated by each of the following.

1.  $92.5(1) = 92.5$
2.  $\pi(a + b) = \pi a + \pi b$
3.  $-7 + 4 = 4 + (-7)$
4.  $14\sqrt{3}$  is a real number.
5.  $29\pi = \pi \cdot 29$
6.  $(2\sqrt{10}) \cdot \sqrt{3} = 2(\sqrt{10} \cdot \sqrt{3})$
7.  $(-8) + | -(-8) | = 0$
8.  $-\sqrt{5} + 0 = -\sqrt{5}$
9.  $(\frac{1}{2} + \frac{1}{4}) + (-\frac{1}{4}) = \frac{1}{2} + [\frac{1}{4} + (-\frac{1}{4})]$
10.  $\frac{3}{5} \cdot \frac{5}{3} = 1$
11.  $(-2)(-3) = (-3)(-2)$
12.  $25(2x + 5y) = 50x + 125y$

Write the property that corresponds to the example problems.

\_\_\_\_\_  $5(3+6)=(5 \times 3)+(5 \times 6)$

\_\_\_\_\_  $(18 \times 10) \times 10 = 18 \times (10 \times 10)$

\_\_\_\_\_  $4 \times 3 = 3 \times 4$

\_\_\_\_\_  $(3 \times 5) \times 2 = 3 \times (5 \times 2)$

\_\_\_\_\_  $(6+8)+(4+6)=(4+6)+(6+8)$

\_\_\_\_\_  $(3+5)+5=3+(5+5)$

\_\_\_\_\_  $(4+12)+18=4+(12+18)$

\_\_\_\_\_  $2 \times 8 = 8 \times 2$

\_\_\_\_\_  $0+6=6$

\_\_\_\_\_  $(6 \times 25) \times 4 = 6 \times (25 \times 4)$

\_\_\_\_\_  $8 \times 0 = 8$

\_\_\_\_\_  $(8 \times 3) - (6 \times 3) = 3 \times (8 - 6)$

\_\_\_\_\_  $18 \times 1 = 18$

\_\_\_\_\_  $16 + (-16) = 0$

\_\_\_\_\_  $18 + 12 = 12 + 18$

\_\_\_\_\_  $(5 \times 10) \times 10 = 5 \times (10 \times 10)$

\_\_\_\_\_  $3 \times (2+5) = (3 \times 2) + (3 \times 5)$

\_\_\_\_\_  $(4+12)+18=4+(12+18)$

\_\_\_\_\_  $21 \times 0 = 0$

## 2.1 Order of Operations

(Textbook Pages: Pages 88– 89)

Name \_\_\_\_\_

A) Complete the following using the order of operations. Do only **ONE STEP** at a time.

For each step, list the specific problem you are doing for that step and its answer in the first column, and then substitute that answer into the problem and state the result in the second column. The first one is completed as an example.

$$1) \quad 5 - 7 + 3^3 \div 9 \cdot (7 - 9)$$

a) Problem/Answer:  $7 - 9 = -2$  Result:  $5 - 7 + 3^3 \div 9 \cdot (-2)$

b) Problem/Answer:  $3^3 = 27$  Result:  $5 - 7 + 27 \div 9 \cdot (-2)$

c) Problem/Answer:  $27 \div 9 = 3$  Result:  $5 - 7 + 3 \cdot (-2)$

d) Problem/Answer:  $3 \cdot (-2) = -6$  Result:  $5 - 7 + (-6)$

e) Problem/Answer:  $5 - 7 = -2$  Result:  $(-2) + (-6)$

f) Problem/Answer:  $(-2) + (-6) = -8$  Result:  $-8$

$$2) \quad 8 + (-3^2 + 3) \div 2 \cdot 4 - 6$$

$$3) \quad [24 \div (1 - 3)^2 + 3 \cdot (-2)]^4$$

Problem/Answer

Result

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_
- e) \_\_\_\_\_
- f) \_\_\_\_\_

Problem/Answer

Result

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_
- e) \_\_\_\_\_
- f) \_\_\_\_\_

$$4) \quad [2 + (3 - 5)6] \div (5 \cdot 8 - 10)$$

Problem/Answer

Result

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_

Problem/Answer

Result

- d) \_\_\_\_\_
- e) \_\_\_\_\_
- f) \_\_\_\_\_

5)  $12 + 25 \div (2 + 3) \cdot (4 - 5)^2$

6)  $-2^2[4(8 - 2 \cdot 3) + 7] - 2^2$

	Problem/Answer	Result
a)	_____	_____
b)	_____	_____
c)	_____	_____
d)	_____	_____
e)	_____	_____
f)	_____	_____

	Problem/Answer	Result
a)	_____	_____
b)	_____	_____
c)	_____	_____
d)	_____	_____
e)	_____	_____
f)	_____	_____
g)	_____	_____
h)	_____	_____

7) 
$$\frac{(3 - 5 \cdot 2^3 + 1) \div 9}{(5 - 6)^3 + 6 \div 2}$$

	Numerator	Result
a)	Problem/Answer _____	_____
b)	_____	_____
c)	_____	_____
d)	_____	_____
e)	_____	_____

	Denominator	Result
a)	Problem/Answer _____	_____
b)	_____	_____
c)	_____	_____
d)	_____	_____

FINAL: Problem/Answer \_\_\_\_\_

B) Exercises: page 91 #56 - 70 all

Show ALL steps ---

DO NOT use a calculator.

# Order of Operations

Name \_\_\_\_\_

Directions: Complete the following using the order of operations. Do only **ONE STEP** at a time. List the specific problem you are doing for that step and its answer in the first column, and then answer into the problem and state the result in the second column.

step,  
it

$$1) \frac{8-2}{3} + 5^2(4+3)$$

$$2) \frac{2^3 - (13+4)}{(-3)^2}$$

Problem/Answer

Result

Problem/Answer

Result

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_
- e) \_\_\_\_\_
- f) \_\_\_\_\_

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_
- e) \_\_\_\_\_

$$3) -1(5+3)^2 - (44+4) + 3$$

$$4) -2[3^2 - (5+2)3] + 3^2$$

Problem/Answer

Result

Problem/Answer

Result

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_
- e) \_\_\_\_\_
- f) \_\_\_\_\_

- a) \_\_\_\_\_
- b) \_\_\_\_\_
- c) \_\_\_\_\_
- d) \_\_\_\_\_
- e) \_\_\_\_\_
- f) \_\_\_\_\_
- g) \_\_\_\_\_



5)  $4 + 9(5 \times 1) + (9 - 7)^1$

6)  $\frac{10 - 3[(3 - 2)6]}{4^2}$

Problem/Answer	Result
a) _____	_____
b) _____	_____
c) _____	_____
d) _____	_____
e) _____	_____
f) _____	_____

Problem/Answer	Result
a) _____	_____
b) _____	_____
c) _____	_____
d) _____	_____
e) _____	_____
f) _____	_____

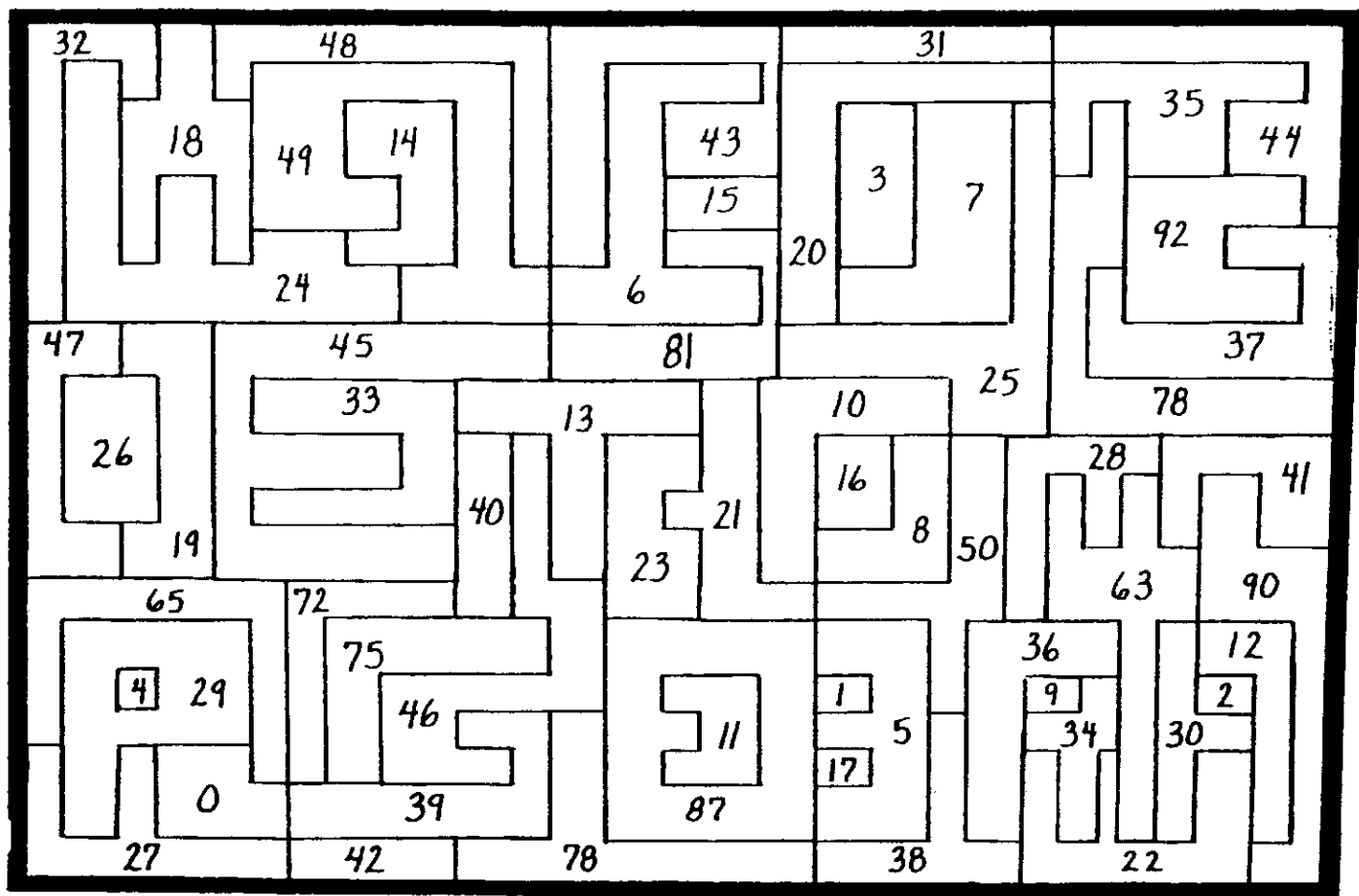
7)  $-2(4)^2 + [4 + 2(3)]^2$

8)  $3^3 - (8 - 10)^3 - 5(2)$

Problem/Answer	Result
a) _____	_____
b) _____	_____
c) _____	_____
d) _____	_____
e) _____	_____
f) _____	_____

Problem/Answer	Result
a) _____	_____
b) _____	_____
c) _____	_____
d) _____	_____
e) _____	_____
f) _____	_____
g) _____	_____

# THE BEGINNING



Simplify each problem. Shade the part of the picture that has the answer. You'll find a greeting!

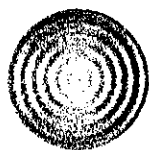
- 1)  $24 \div 3 + 4 - 5$
- 2)  $15 \div 3 \times 6$
- 3)  $8 - (6 - 3)$
- 4)  $3 \times 3 + 1^2$
- 5)  $7(4 + 9 - 8)$
- 6)  $4 \times 2^2 - 10$
- 7)  $18 + 7 \times 6 \div 2$
- 8)  $\frac{2 \times 7 + 5 \times 3}{30 - 29}$
- 9)  $3 \times 2(3 - 1 + 2)$
- 10)  $8 + 2 \times 3^2 - 3 + 4^2 - 5$
- 11)  $\frac{8(3 + 4) - 2 \times 8}{5 - 3}$
- 12)  $8 + 3(7 - 4) - (13 - 9)$
- 13)  $(28 - 3) + (125 - 75)$
- 14)  $3[2 + 5(3 - 1)]$
- 15)  $2[3(7 - 5) + 4(8 + 2)]$
- 16)  $\frac{20 - [4^2 \div (2 + 14)] + 5}{4^2 - 13}$
- 17)  $23 - [(5 - 2)^2 + 8 \div 4]$
- 18)  $[(2 + 4 \times 3) - 8] + 9^2$
- 19)  $3[2(7 + 3) - 5(6 - 2)]$
- 20)  $98 - [(3 + 5)^2 - (4^2 - 1)]$

# WHY ISN'T A SNOWMAN VERY SMART?

Simplify the expression. For each set of exercises, there is one extra answer. Write the letter of this answer in each box that contains the number of that exercise set.

6 3 6 2 10 10 8 1 4 7 9 2 5 8 10

1	$a. n^2 \cdot n^3$ $b. n^7 \cdot n^4$ $c. 2n^5 \cdot 5n$ $d. 10n^3 \cdot n^8$	Answers (C) $10n^6$ (T) $n^5$ (E) $10n^{11}$ (O) $10n^8$ (J) $n^{11}$	6	$a. \frac{m^8}{m^3}$ $b. \frac{m^3}{m^8}$ $c. \frac{40m^{11}}{8m^4}$ $d. \frac{8m^4}{40m^{11}}$	Answers (G) $\frac{1}{m^5}$ (B) $\frac{1}{5m^7}$ (H) $5m^{15}$ (T) $m^5$ (M) $5m^7$
2	$a. (y^3)^2$ $b. (y^5)^2$ $c. (7y^2)^2$ $d. (5y^4)^3$	Answers (B) $125y^{12}$ (A) $15y^8$ (R) $y^{10}$ (U) $49y^4$ (L) $y^6$	7	$a. t^6 \cdot t^5$ $b. t^6 + t^5$ $c. 3t \cdot 8t^3$ $d. 3t + 8t^3$	Answers (K) $24t^4$ (L) $t^{11}$ (N) $3t + 8t^3$ (B) $11t^8$ (C) $t^6 + t^5$
3	$a. \frac{v^5}{v^2}$ $b. \frac{v^9}{v^4}$ $c. \frac{20v^8}{5v}$ $d. \frac{44v^7}{11v^6}$	Answers (H) $4v$ (N) $v^5$ (I) $v^3$ (T) $4v^7$ (E) $4v^5$	8	$a. (15k)^2$ $b. 15k + 15k$ $c. (2k^6)^5$ $d. (2k^5)^6$	Answers (L) $30k$ (D) $225k^2$ (N) $30k^{30}$ (R) $32k^{30}$ (G) $64k^{30}$
4	$a. 2a^3 \cdot 5a^3$ $b. 2a^3 + 5a^3$ $c. 9a^8 \cdot 4a^8$ $d. 9a^8 + 4a^8$	Answers (L) $10a^6$ (N) $36a^{16}$ (W) $13a^{16}$ (D) $7a^3$ (R) $13a^8$	9	$a. \frac{49x^7}{7x^2}$ $b. \frac{49x^2}{7x^7}$ $c. \frac{7x^7}{49x^2}$ $d. \frac{7x^2}{49x^7}$	Answers (M) $\frac{x^5}{7}$ (Y) $\frac{7}{x^5}$ (U) $\frac{1}{7x^5}$ (R) $7x$ (L) $7x^5$
5	$a. (4q)^3$ $b. 4q + 4q + 4q$ $c. (q^3)^4$ $d. q^3 + q^3 + q^3 + q^3$	Answers (T) $12q$ (I) $4q^{12}$ (R) $64q^3$ (P) $4q^3$ (F) $q^{12}$	10	$a. (-w^3)^2$ $b. (-w^3)^3$ $c. (-w^3)^4$ $d. (-w^3)^5$	Answers (T) $w^6$ (F) $w^{12}$ (D) $-w^{15}$ (P) $-w^9$ (S) $-w^{12}$



# Practice Masters Level A

## 2.2 Properties of Exponents

Evaluate each expression.

1.  $5^{-2}$  \_\_\_\_\_
2.  $(4 \cdot 3)^2$  \_\_\_\_\_
3.  $14^0$  \_\_\_\_\_
4.  $\left(\frac{1}{3}\right)^{-2}$  \_\_\_\_\_
5.  $\left(\frac{3}{4}\right)^3$  \_\_\_\_\_
6.  $\left(\frac{1}{4}\right)^{-4}$  \_\_\_\_\_
7.  $27^{\frac{1}{3}}$  \_\_\_\_\_
8.  $64^{\frac{2}{3}}$  \_\_\_\_\_
9.  $25^{\frac{5}{2}}$  \_\_\_\_\_
10.  $81^{\frac{1}{2}}$  \_\_\_\_\_
11.  $100^{\frac{-1}{2}}$  \_\_\_\_\_
12.  $32^{\frac{-1}{5}}$  \_\_\_\_\_
13.  $-2(2 \cdot 5^2)^2$  \_\_\_\_\_
14.  $(3^2 \cdot 2^4)^0$  \_\_\_\_\_

Simplify each expression, assuming that no variable equals zero.

Write your answer with positive exponents.

15.  $m^5 m^{-4}$  \_\_\_\_\_
16.  $(x^3)^5$  \_\_\_\_\_
17.  $x^6 x^{-10}$  \_\_\_\_\_
18.  $(x^{-2})^3$  \_\_\_\_\_
19.  $(r^{-3})^{-1}$  \_\_\_\_\_
20.  $p^1 p^{-5}$  \_\_\_\_\_
21.  $\frac{w^{15}}{w^3}$  \_\_\_\_\_
22.  $\frac{w^{-4}}{w^{-2}}$  \_\_\_\_\_
23.  $\left(\frac{2w^2}{w^{-6}}\right)$  \_\_\_\_\_
24.  $\left(\frac{4x^{-2}}{x^3}\right)^{-3}$  \_\_\_\_\_
25.  $(xy^2)(xy^4)$  \_\_\_\_\_
26.  $(-t^3)(-t^4)(-t^2)$  \_\_\_\_\_
27.  $(4xy)^2(-x^2y)^5$  \_\_\_\_\_
28.  $(-2a^2b^3)^2(-3a^3b^4)^3$  \_\_\_\_\_
29.  $\frac{x^{-10}}{2x^{-5}}$  \_\_\_\_\_
30.  $(-y^3)\left(-\frac{y^6}{y^{-2}}\right)$  \_\_\_\_\_

## Properties of Exponents

Date \_\_\_\_\_ Period \_\_\_\_\_

**Simplify. Your answer should contain only positive exponents.**

1)  $2m^2 \cdot 2m^3$

2)  $m^4 \cdot 2m^{-3}$

3)  $4r^{-3} \cdot 2r^2$

4)  $4n^4 \cdot 2n^{-3}$

5)  $2k^4 \cdot 4k$

6)  $2x^3y^{-3} \cdot 2x^{-1}y^3$

7)  $2y^2 \cdot 3x$

8)  $4v^3 \cdot vu^2$

9)  $4a^3b^2 \cdot 3a^{-4}b^{-3}$

10)  $x^2y^{-4} \cdot x^3y^2$

11)  $(x^2)^0$

12)  $(2x^2)^{-4}$

13)  $(4r^0)^4$

14)  $(4a^3)^2$

15)  $(3k^4)^4$

16)  $(4xy)^{-1}$

$$17) (2b^4)^{-1}$$

$$18) (x^2 y^{-1})^2$$

$$19) (2x^4 y^{-3})^{-1}$$

$$20) (3m)^{-2}$$

$$21) \frac{r^2}{2r^3}$$

$$22) \frac{x^{-1}}{4x^4}$$

$$23) \frac{3n^4}{3n^3}$$

$$24) \frac{m^4}{2m^4}$$

$$25) \frac{3m^{-4}}{m^3}$$

$$26) \frac{2x^4 y^{-4} z^{-3}}{3x^2 y^{-3} z^4}$$

$$27) \frac{4x^0 y^{-2} z^3}{4x}$$

$$28) \frac{2h^3 j^{-3} k^4}{3jk}$$

$$29) \frac{4m^4 n^3 p^3}{3m^2 n^2 p^4}$$

$$30) \frac{3x^3 y^{-1} z^{-1}}{x^{-4} y^0 z^0}$$

## Simplifying Rational Exponents

**Simplify.**

1)  $(n^4)^{\frac{3}{2}}$

2)  $(27p^6)^{\frac{5}{3}}$

3)  $(25b^6)^{-1.5}$

4)  $(64m^4)^{\frac{3}{2}}$

5)  $(a^8)^{\frac{3}{2}}$

6)  $(9r^4)^{0.5}$

7)  $(81x^{12})^{1.25}$

8)  $(216r^9)^{\frac{1}{3}}$

**Simplify. Your answer should contain only positive exponents with no fractional exponents in the denominator.**

9)  $2m^2 \cdot 4m^{\frac{3}{2}} \cdot 4m^{-2}$

10)  $3b^{\frac{1}{2}} \cdot b^{\frac{4}{3}}$

11)  $\left(p^{\frac{3}{2}}\right)^{-2}$

12)  $\left(a^{\frac{1}{2}}\right)^{\frac{3}{2}}$

## Review of Algebraic and Numeric Expressions

Date \_\_\_\_\_ Period \_\_\_\_\_

**Evaluate each expression.**

1)  $(7 - 2) \div 5$

2)  $(3 + 3)^2$

3)  $(6 - 3)^2$

4)  $5 + (16 \div 2) \div 3$

5)  $(-6 \times 2) \div -3$

6)  $2 + 12 \div 2 + 1$

7)  $-4 - (1 - 5) - (-4)^2$

8)  $-3 \times 2 \times 2(-3 - 1)$

9)  $(4 - 3)(1 - (3 + 5)) \times 5$

10)  $((-16 - (-2 + 1)) \times 2) \div 5$

11)  $2 - 8 \div -2 - 3 - -12 \div -6 \times -2$

12)  $(-11 - 6 - -5 + 1 + 3 \times 2) \div -5$

**Evaluate each using the values given.**

13)  $y + z + 2$ ; use  $y = -6$ , and  $z = 5$

14)  $p(q \div 3 - p)$ ; use  $p = -6$ , and  $q = -3$



15)  $z \div 6 + x + x - 5$ ; use  $x = 1$ , and  $z = 6$

16)  $x(z + 3) + 1 + 3 - y$ ; use  $x = 6$ ,  $y = -5$ , and  $z = 2$

17)  $6 + q + 5 - (q - p) + 15$ ; use  $p = 1$ , and  $q = 1$

18)  $-3 \div 3(a + c(b + 5) - (-6 + a))$ ; use  $a = 1$ ,  $b = -6$ , and  $c = -4$

**Simplify each expression.**

19)  $9x + 9 - 1$

20)  $10n - 4n$

21)  $-9 - 6(-v + 5)$

22)  $-10(-8x + 9) - 8x$

23)  $1 + 4(2 - 3k)$

24)  $-8v + 6(10 + 6v)$

25)  $7(1 + 9v) - 8(-5v - 6)$

26)  $-10(x - 7) - 7(x + 2)$

27)  $-2(-6x - 9) - 4(x + 9)$

28)  $9(7k + 8) + 3(k - 10)$

**Algebra 2**  
**Unit 1 Review**

Name \_\_\_\_\_  
Date \_\_\_\_\_

**I. Classify the numbers by putting an X in the space for the set of numbers for which it belongs.**

	N	W	I	Q	Ir	R
1.) 8						
2.) $0.\overline{34}$						
3.) -5						
4.) $2\frac{1}{2}$						
5.) 0						

**II. Match each property on the right to the example that illustrates it on the left.**

- \_\_\_\_\_ 6.)  $2ab = 2ba$
- \_\_\_\_\_ 7.)  $5(3x + 1) = 15x + 5$
- \_\_\_\_\_ 8.)  $a + b$  is a real number
- \_\_\_\_\_ 9.)  $x + 3 = 3 + x$
- \_\_\_\_\_ 10.)  $10(1) = 10$
- \_\_\_\_\_ 11.)  $6 + (-6) = 0$
- \_\_\_\_\_ 12.)  $(9x + 7) + 2 = 9x + (7 + 2)$
- \_\_\_\_\_ 13.)  $3\frac{3}{4} \cdot \frac{4}{15} = 1$
- \_\_\_\_\_ 14.)  $ab$  is a real number
- \_\_\_\_\_ 15.)  $14 + 0 = 14$

- A.) Closure Prop. of Add.
- B.) Closure Prop. of Mult.
- C.) Commutative Prop. of Add.
- D.) Commutative Prop. of Mult.
- E.) Associative Prop. of Add.
- F.) Associative Prop. of Mult.
- G.) Inverse Prop. of Add.
- H.) Inverse Prop. of Mult.
- I.) Identity Prop. of Add.
- J.) Identity Prop. of Mult.
- K.) Distributive Property

**III. Evaluate each expression by using the order of operations.**

16.)  $21 - 3 + 2 \cdot 4 - 6^2 + 2$

17.)  $(5 - 2)^3 + 6 \cdot (-4 - 1)$

**IV. Simplify the monomials.** (No negative exponents may remain in your answer)

18.)  $x^5 \cdot x^{-7} =$

19.)  $(4x^5)^3 =$

20.)  $\left(\frac{a^2}{a^3b^5}\right)^{-4} =$

21.)  $\frac{(5a^3b)^2(-2a)^2}{10a^8b} =$

22.)  $(-x^3y^{-3}z^8)^2(2x^4y)^3 =$

23.)  $\left(\frac{3}{5}\right)^{-2} =$

24.)  $121^{\frac{1}{2}} =$

25.)  $-36^{\frac{3}{2}} =$

26.)  $\left(\frac{12x^2y^{-3}z^{-7}}{4xy^{-4}z^3}\right)^{-2} =$

27.)  $(81x^{-2}y^2)^{\frac{3}{2}}$